Power Management Controls:
October 24, 2002 Final PAC Meeting — Meeting Summary

As the Power Management Controls project nears its conclusion, this was the final PAC meeting. With the decisions made at this meeting, the content of the standard is now set. The most important next step is for manufacturers to implement the standard in new products. In September, the IEEE New Standards Committee approved creating a working group to develop this as an IEEE standard (IEEE 1621). In preparation for this, the User Interface Standard will be recast in the IEEE Standard format. The outline for the Final Report to the Energy Commission was included in the agenda; the appendices are where most of detailed the results will be located. On the call were representatives of HP (2), IBM, Microsoft, Samsung, and Sun.

Dynamic Behavior

We first reviewed the nine recommendations on "Dynamic Behavior" released on August 19. Several PAC members raised concern about how the *up/down* metaphor for power states was presented, noting that this seemed to conflict with the recommended use of *on* and *off*. The text will be changed to clarify that these are for use only *in addition* to *on* and *off*, not instead of, and to be used when only the direction is clear, for example, when "powering down" to either *sleep* or *off*. *On* and *off* remain at the core of the standard.

Concern was raised over the use of flashing amber for transitions on the power indicator (whether it might conflict with the use of flashing amber on some products for low-power modes and uses in which amber indicates attention is required), and whether the direction of the transition needs to be indicated. The PAC ultimately concluded that the recommendation as-is was OK.

A PAC member asked about the behavior of power buttons, about the difficulty of mapping three states on to one button, and whether pressing a power button should always wake up a sleeping device. Bruce noted that this was one of two outstanding "problems": a mechanical switch, as used on some monitors, will necessarily *turn off* a sleeping device when pressed; this is in contrast to a device like a modern PC in which the power button will *wake up* a sleeping device. There does not seem to be a good solution to this inconsistency. One solution, using the two power symbols (⏻ and ⏽) to imply different behavior, is problematic as the difference in their meaning is in the power consumption in the *off* state; while this correlates with the behavior when pressed in sleep (most devices with ⏻ will turn off), that cannot be relied on, nor should it be imposed. What we can do is state that *when it cannot be simply reversed*, pressing a *power button* will wake up a sleeping device (a monitor can be turned back on without ill effect).

A member observed that the final recommendation (on inputs) was weak, did not provide implementation guidance (no icons mentioned), and addressed a problem that may occur in future but is not one at present. We agreed to drop this from the standard, though the issue will be noted as something to revisit in the future.

Testing

We reviewed the highlights of the recent testing, and in the course of the discussion noted that all of the findings either support the rationale behind the standard as it exists, or at least do not conflict with it. The issues tested were the meaning of the power symbols (only half of respondents recognized them as power symbols and none knew the difference in meaning) and indicator lights (the association between amber and sleep is stronger than others and flashing calls attention to itself — which sleep states should not do).

A member asked about the use of rocker switches vs. power buttons. The testing did not address rocker switches, but this raises the other outstanding problem. Most people think that ⏽ means "power" or "power on", but when used on a rocker switch that doesn't do a mains disconnect, it is used in place of ○ and so means effectively *off* — the opposite meaning. Safety professionals are adamant that ○ and ⏻ should only be used for zero-power switches.

Bruce also noted that another testing study was done earlier this year at Cornell with 105 respondents. It was quite similar to the Fall 2001 testing done at UC Berkeley and produced similar results. That study will be posted on the Controls project web site.

Hibernate

How to present the "hibernate" state to PC users remains a problem. In September, Bruce posted a 5-page (hopefully) unbiased discussion of all reasonable solutions to the hibernate problem. The hope is to use it to organize the various viewpoints on hibernate and work towards a consensus. Critical review by those who favor different solutions has not yet been forthcoming, though a few people have provided general comments. On the call, we did not attempt to come to consensus, but rather to identify any *processes* by which that could be done in future.

After some discussion to clarify the issue (e.g. that hibernate is electrically the same as off-by-shutdown of the operating system), the main suggestion to emerge was that the ACPI community should be asked to grapple with the problem. There is an ACPI email reflector, though the protocol is not actively being worked on at this time. For some companies, the people most critical to the issue are not part of the PAC. It was agreed that industry-wide commitment to a single solution is highly desirable.

Next Steps — Implementing the Standard

The final part of the meeting was about how to take the standard from its current state to being embodied in future products. One track of this is national and international standards. The IEEE process should take about one year, though could be delayed by coordination with international standards committees, principally those for graphical symbols. All PAC members are invited and encouraged to become members of the working group, which does not cost money, require membership in IEEE, or require attending meetings in person. However, voting on the standard at the end of the process does require membership in IEEE.

We next went around "the room" with each person making comments about implementation within their own company. In keeping with past practice for this project, individuals and companies are not identified.

- Can't commit at this time; other processes in the company need to get further along before can comment.
- Work with the "ACPI group" should be a priority, as hibernate is still a problem. We have already used the project to motivate discussions and are seeing benefits and synergies in our own products from that.
- Have been getting some positive response. Simply asking the question has revealed discrepancies among company products, particularly between different kinds of products. Our group will probably move in the direction of the standards. Corporate design guidelines are generally not in English, which is a barrier.
- There are a few outstanding questions for us, but no showstoppers.
- Need to take it to other teams before I can be sure about implementation.
- Feedback to date has been positive. It will take further work by me to bring it to all the product groups. Getting an IEEE document that addresses the symbols would help to get agreement from others on that.

The next discussion about implementation was what "marketing" materials needed to be prepared, what meetings or conferences should be targeted to present at, what magazines or organizations should be contacted, etc. One request was for a set of "design guidelines" targeted solely to implementation (unlike the standards development documents created so far) that can be handed off to designers. These should be concise — making good use of tables — and divided into topics such as indicators, symbols, and behavior. VESA (Video Electronics Standards Association) is presently working on a new monitor power saving document that could refer to the interface standard. IDSA (Industrial Designers Society of America), and HFES (Human Factors and Ergonomics Society) were also mentioned as good outreach opportunities, along with the ACPI email reflector, and possibly the MAC (Mobile Advisory Council). The next WinHEC (Windows Hardware Engineering Conference) may also be an opportunity. Ongoing work to put the standard into future ENERGY STAR specifications is also important.

Concluding Remarks

As this was the final PAC meeting of the project, Don Aumann of the California Energy Commission (project sponsor) and Bruce Nordman and Alan Meier of LBNL all expressed their deep appreciation to the PAC for their time and work on this project. Needless to say, it could not have succeeded without the PAC's interest and support. However, you don't get off so easy. We want you to join the IEEE working group for the project (IEEE # 1621) and to provide additional outreach ideas and continued feedback. More on that soon.

Thank you!